

SECTION 08520 ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

- A. This Section includes fixed and operable aluminum windows of the performance class indicated. Window types required include the following:
 - 1. Projected windows
 - 2. Fixed windows.

1.3 DEFINITIONS

- A. Performance class number, included as part of the window designation system, is the actual design pressure in pounds force per square foot used to determine structural test pressure and water test pressure.
 - 1. Structural test pressure, wind load test, is equivalent to 150 percent of the design pressure.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.
- B. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:
 - 1. Design wind pressure: 30 psf acting inward and outward.
 - 2. Test Procedures: Test window units according to ASTM E 283 for air infiltration, ASTM E 331 for water penetration, and ASTM E 330 for uniform load deflection and structural performance.
- C. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in AAMA 101 for air infiltration, water penetration, and structural performance for type, grade, and performance class of window units required. Where required design pressure exceeds the minimum for the specified window grade, comply with requirements of AAMA 101, "Optional Performance Classes," for higher than minimum performance class.
 - 1. Air-Infiltration Rates:
 - a. Operable Windows: Air-Infiltration Rate for Operating Sash: Not more than 0.10 cfm/ft. of area for an inward test pressure of 6.24 lbf/sq. ft.
 - b. Fixed Windows: Not more than 0.06 cfm/ft. of area for an inward test pressure of 6.24 lbf/sq. ft.
 - 2. Water Penetration: No water penetration as defined in the test method at an inward test pressure of 10 psf.
 - 3. Uniform Load Deflection: No deflection in excess of 1/175 of any member's span during the imposed load, for a positive (inward) and negative (outward) test pressure as follows:
 - a. Operable Windows: 50 psf.

- b. Fixed Windows: 65 psf.
4. Structural Performance:
 - a. Operable Windows: No failure or permanent deflection in excess of 0.2 percent of any member's span after removing the imposed load, for a positive (inward) and negative (outward) test pressure of 75 lbf/sq. ft.
 - b. Fixed Windows: No failure or permanent deflection in excess of 0.2 percent of any member's span after removing the imposed load, for a positive (inward) and negative (outward) test pressure of 97.5 lbf/sq. ft.
5. Condensation Resistance: Where window units are indicated to be "thermally improved," provide units tested for thermal performance according to AAMA 1503.1 showing a condensation resistance factor (CRF) of 55.
6. Thermal Transmittance: Provide window units with a U-value maximum of 0.69 Btu/sq. ft. x h x deg F at 15-mi./h exterior wind velocity, when tested according to AAMA 1503.1.
7. Forced-Entry Resistance: Comply with Performance Level 10 requirements when tested according to ASTM F 588.
8. Thermal Movements: Provide window units that allow thermal movement resulting from the following maximum change (range) in ambient temperature when engineering, fabricating, and installing aluminum windows to prevent buckling, opening of joints, and overstressing of components, connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to solar heat gain and nighttime sky heat loss.
 - a. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

- A. Product Data for each type of window required, including the following:
 1. Construction details and fabrication methods.
 2. Profiles and dimensions of individual components.
- B. Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:
 1. Elevations at 1/4 inch = 1 foot scale and typical window unit elevations at 3/4 inch = 1 foot scale.
 2. Full-size section details of typical composite members, including reinforcement and stiffeners.
 3. Hardware, including operators.
 4. Location of weep holes.
 5. Glazing details.
- C. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated based on comprehensive testing of current window units within the last 5 years. Test results based on use of down-sized test units will not be accepted.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Check window openings by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

- A. Special Warranty: Submit a written warranty signed by aluminum window manufacturer agreeing to repair or replace window components that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
 - 2. Faulty operation of sash and hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- B. Warranty Period: 3 years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: Subject to compliance with requirements, provide the following products:
 - 1. EFCO Corporation.
 - 2. Kawneer.
 - 3. Moduline.
 - 4. TRACO.

2.2 MATERIALS

- A. Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000 psi ultimate tensile strength and not less than 0.090 inch thick at any location for main frame and sash members.
 - 1. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
- B. Sheet Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of ASTM B 209.
- C. Fasteners: Provide aluminum or nonmagnetic stainless steel warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
 - 1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 - 2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- D. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.
- E. Compression-Type Glazing Strips and Weatherstripping: Provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC620, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.
- F. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic,

nonshrinking, and nonmigrating. Comply with Division 7, Section 07920, "Joint Sealants" of these Specifications for selection and installation of sealants.

2.3 HARDWARE

- A. Provide manufacturer's standard hardware fabricated from stainless steel, and of sufficient strength to perform the function for which it is intended.
- B. Four-Bar Friction Hinges: Comply with AAMA 904.1.
 - 1. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.
- C. Limit Device: Provide manufacturer's standard, concealed support arms with adjustable, limited, hold-open limit device designed to restrict ventilator opening.

2.4 ACCESSORIES

- A. Provide manufacturer's standard accessories that comply with indicated standards.
- B. Weatherstripping: Provide compression-type weatherstripping at perimeter of each operating sash. Provide weatherstripping locked into extruded grooves in sash.

2.5 PROJECTED WINDOWS

- A. Window Grade and Class: Comply with requirements of AAMA Grade and Performance Class P-AW50. Window units shall successfully pass life-cycle test requirements specified in AAMA 910.
- B. Hardware: Provide the following equipment and operating hardware:
 - 1. Hinges: Concealed 4-bar friction hinges with adjustable slide shoe (2 per ventilator).
 - a. Provide ventilator operation that permits cleaning of outside glass face from the interior.
 - 2. Lock: Cam-action, sweep lock handle with surface-mounted strike.
 - 3. Limit Device: Stay bar with adjustable hold-open device.

2.6 FIXED WINDOWS

- A. Window Grade and Class: Comply with requirements of AAMA Grade and Performance Class F-HC-65.

2.7 FABRICATION

- A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
 - 1. Provide units that are reglazable without dismantling sash or ventilator framing.
 - 2. Prepare window sash or ventilators for glazing, except where preglazing at the factory is indicated.
- B. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance, thermal barrier, located between exterior materials and window members exposed on interior, in a manner that eliminates direct metal-to-metal contact.
 - 1. Provide thermal-break construction that has been in use for not less than 3 years, has been tested to demonstrate resistance to thermal conductance and condensation, and has been tested to show adequate strength and security of glass retention.

2. Provide hardware with low conductivity or nonmetallic material for hardware bridging thermal breaks at frame or vent sash.
3. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
4. Glazing Stops: Provide snap-on glazing stops, coordinated with glass selection and glazing system indicated. Finish to match window units.

2.8 FINISHES

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's instructions.
 1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
 2. Color and Gloss: Match Construction Manager's sample.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.
- B. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.
 1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.
 2. Sealants, joint fillers, and gaskets to be installed after installation of window units are specified in other Division 7 Sections.

3.2 CLEANING

- A. Clean aluminum surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.
- B. Clean glass of preglazed units promptly after installing windows. Comply with requirements of Division 8, Section 08800, "Glazing" for cleaning and maintenance.

3.3 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to aluminum window manufacturer, that ensure window units are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08520